

Applicants: Dev et al.
Application No.: 10/020,531
Filed: December 14, 2001
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In the Claims

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1. (Twice Amended) An apparatus for introducing a composition into at least one cell in a vessel in a subject comprising:

- a catheter having at least one inflatable balloon portion;
- at least one infusion opening for introducing the composition into the subject proximal to the at least one inflatable balloon portion;
- a first electrode positioned adjacent to at least one infusion opening; and
- a second electrode, wherein said first and second electrodes are suitable to receive an electric pulse having an electroporating voltage in the range of about 10 Volts to 200 Volts and having a pulse length of about 100 microseconds to 100 milliseconds, and wherein said second electrode is proximally positioned with respect to the first electrode and the subject such that when the electric pulse is applied to the first and second electrodes an electric field is generated in the subject of between 0.5 and 5.0 kV/cm, which is sufficient to cause electroporation of at least one cell in the vessel before, during or after introduction of the composition into the subject through the at least one infusion opening.

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2. (Amended) The apparatus of claim 1, further comprising an electrical source connected to the first and second electrodes for applying the electric pulse to the electrodes.

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10. (Amended) A catheter comprising:

a first inflatable balloon portion near the distal end of the catheter;

a second inflatable balloon portion proximal to the first inflatable balloon, wherein inflation of the first and second balloon portions occludes a vessel between the first and second balloon portions;

at least one infusion opening for introducing a composition into a subject located between the first and second balloon portions;

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a first electrode positioned adjacent to or integral with at least one infusion opening; and

a second electrode, wherein said first and second electrodes are suitable to receive an electric pulse having an electroporating voltage in the range of about 10 Volts to 200 Volts and having a pulse length of about 100 microseconds to 100 milliseconds, and wherein said second electrode is proximally positioned with respect to the first electrode and the subject such that when the electric pulse is applied to the first and second electrodes an electric field is generated in the subject of between 0.5 and 5.0 kV/cm, which is sufficient to cause electroporation of at least one cell before, during or after introduction of the composition through the at least one infusion opening.

11. (Amended) The catheter of claim 10, further comprising an electrical source connected to the first and second electrodes for applying the electric pulse to the electrodes.

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17. (Amended) An apparatus for introducing a composition into at least one cell in a vessel in a subject comprising:
- a catheter having at least one inflatable balloon portion at a position other than the distal end of the catheter;
 - at least one infusion opening for introducing the composition into the subject;
 - a first electrode positioned adjacent to at least one infusion opening; and
 - a second electrode, wherein said first and second electrodes are suitable to receive an electric pulse having an electroporating voltage in the range of about 10 Volts to 200 Volts and having a pulse length of about 100 microseconds to 100 milliseconds, and wherein said second electrode is proximally positioned with respect to the first electrode and the subject such that when the electric pulse is applied to the first and second electrodes an electric field is generated in the subject of between 0.5 and 5.0 kV/cm, which is sufficient to cause electroporation of at least one cell before, during or after introduction of the composition through at least one infusion passage.
18. (Amended) The apparatus of claim 17, further comprising an electrical source connected to the first and second electrodes for applying the electric pulse to the electrodes.
19. (Amended) The apparatus of claim 17, wherein the vessel is a blood vessel.
20. (Amended) The apparatus of claim 17, wherein the first electrode is formed at least in part by a biologically inert material.

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21. (Amended) The apparatus of claim 17, wherein the second electrode is a guidewire in the catheter.

22. (Amended) The apparatus of claim 17, wherein the second electrode is a silver plate configured to be placed in contact with the subject.

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Please add the following new claims:

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23. (New) The apparatus of claim 1, wherein the first electrode and the second electrode is separately selected to be a single electrode or multiple electrodes.

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24. (New) The apparatus of claim 23, wherein the multiple electrodes are interdigitated electrodes or concentric ring electrodes.


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25. (New) The catheter of claim 10, wherein the first electrode and the second electrode is separately selected to be a single electrode or multiple electrodes.

26. (New) The apparatus of claim 25, wherein the multiple electrodes are interdigitated electrodes or concentric ring electrodes.

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27. (New) The apparatus of claim 17, wherein the first electrode and the second electrode is separately selected to be a single electrode or multiple electrodes.

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 28. (New) The apparatus of claim 27, wherein the multiple electrodes are interdigitated electrodes or concentric ring electrodes.
